

SCIENTIFIC AND MECHANICAL MUSICAL INSTRUMENTS AND CAMERAS

Tuesday 4 November 2014
Knightsbridge, London



Bonhams

ASTROLABE: A 16TH CENTURY POCKET COMPUTER

189

AN IMPORTANT SINGLE SHEET EUROPEAN UNIVERSAL ASTROLABE, NOT SIGNED OR DATED, ENGRAVED BY TWO HANDS, THE FIRST WORKING IN THE MID TO LATE 15TH CENTURY, THE SECOND IN THE THIRD QUARTER (OR SLIGHTLY LATER) OF THE 16TH CENTURY

The single engraved sheet has an integral two lobed throne with central mount to which the attachment piece for the suspension ring is riveted. This throne is similar to those found on several other late Medieval (mainly 14th century) astrolabes. For the use of a single sheet for the instrument, parallels are provided by the Merton equatorium and the astrolabe in Oriel College, Oxford.



Obverse

The plate is fully engraved with (reading from the circumference inwards):

- a) a degree scale in four quadrants reading 0-90-0-90-0 from the East and West points and divided to 1°; the direction of the numerals, which are executed in neat gothic characters, is reversed in each quarter.
- b) A zodiacal calendar (eccentric-type) with zodiacal signs divided to 1° and numbered by groups of ten, within this is the month calendar which reads to one day by groups of ten or eleven, although February has only 28 days. 0° Aries = 11.8 March. This value, although not conclusive, is consonant with a date in the mid-15th century.
- c) Equal hours, marked every 15°, in Roman numerals (I-XII x 2), probably by the same hand as executed the degree graduation in circle a).
- d) In the upper two thirds of the central space the diagram for a latitude plate for (calculated value), 51° + a few arc minutes. The almucantars, which are drawn for every 2°, are twice numbered by groups of ten, once from the horizon to the zenith and once along an (added) equinoctial arc. These numbers however are in a semi-italic hand and have clearly been added later, several of the numbers being engraved over the almucantars. Probably at the same time the numbered lines were pecked to make them more distinctive.
- e) Beneath the latitude diagram is a shadow square of twelve numbered, in gothic script, in groups of four with each unit divided to fifths to give 60 divisions.
- f) Within this is a later (mid-16th century italic hand) addition of a second shadow square of ten, numbered in groups of two each divided to five to give fifty divisions. That the scale is a later addition is confirmed by the upper vertical ends running over the azimuths of the latitude diagram.
- g) Above the east side of the shadow square a small unequal hour diagram has been drawn using italic numerals.
- h) Beneath the horizon is a set of pecked unequal hour lines with later italic numerals.
- i) A series of twelve pecked arcs run over the entire diagram; they mark the boundaries of the twelve astrological houses and have later italic numerals.
- j) An ecliptic scale engraved over the horizon and almucantar grid, with the signs indicated by their symbols, each being divided to thirty degrees, is also part of the later additions.

Reverse

- a) A full 360° scale is engraved along the circumference reading, from the south point beneath the throne, to 1° and numbered by groups of ten in gothic numerals reading inwards and with roman numerals for the hours every 15°.
- b) In the same band as the hour numerals a second degree scale in italic numerals reading outwards, counter clockwise from the East point, has been added.
- c) The centre is entirely filled by a universal stereographic projection of the sphere (sphaera azarchelis) without star positions but with half ecliptic arcs engraved along the 56° arcs on either side of the Equator, each sign divided to thirty by numbered groups of 10°. The meridians and latitude arcs are numbered along their central diameters. A diameter running across the diagram at an angle of 23.5° to the East-West line is divided and engraved with the signs of the ecliptic. A diameter symmetrical to it is not so divided.

A diametrical rule, engraved in the half closest to its fiducial edge with a scale of paired ecliptic signs and beneath this a degree scale reading from the centre to the right 0-90 and then beneath in the reverse direction 100-270, continuing above 280-360, is mounted on the reverse of the instrument. Attached to the rule through a plain central strut is an arc carrying a zodiac scale. This has six divisions each containing two names and signs, the Spring and Summer names being written so as to be read towards the centre of the instrument, the Autumn and Winter signs being read outwards from the centre. As an additional distinction the latter names and signs are crossed through. A similar arrangement is employed for the numbers, ten, twenty, thirty, which accumulate the 1° divisions of each sign. This arc is engraved in the same gothic hand as the zodiacal calendar on the obverse and the degree scale on the reverse. The arc is integral with the strut that connects it to the rule, this strut being neatly undercut and pinned to the centre of the rule. Mounted above the rule, also from the centre, is a radial arm carrying an undivided 90° scale using italic numerals; a brachiolus is mounted above this. It is probable that the radial arm was originally a cursor sliding along the rule, and that a brachiolus, though probably a smaller one, was mounted in the hole at its outer end. The metal and engraving of the rule and the radius appear to be the same.

Mounted on the reverse of the instrument is a counter-changed alidade with fixed sights. Two brachioli have been mounted on opposing sides of the centre at the beginning of the counter-change.

11 1/2 in (29cm) diameter

£80,000-120,000

€100,000-150,000

Provenance

Joannes Beckers (1761-1825), hence by descent to his son, Henricus Joseph Beckers (1794-1853), hence by descent to his daughter Anna Barbera Catharina (1832-1889), married to Jan Gerard Beckers. Then by descent to their son Hendrik Joseph Beckers (1862-1950), and hence by descent to his grandchildren, the present owners

**“A rare and unusual form of
universal astrolabe in late
Medieval Europe”**



Although incomplete, the instrument is of high technical and historical interest, but poses considerable problems of interpretation. The following remarks are therefore tentative.

It is clear that two hands have worked on the instrument.

Hand one employs extremely well formed and neatly engraved gothic letters and numerals. The zodiacal calendar, the shadow square of twelve and the latitude diagram on the obverse can be ascribed to this hand as can the degree scale on the circumference of the reverse, and the zodiac arc attached to the rule on the same side.

The second hand employs italic letters and numerals, also well formed and neatly executed. The shadow square of ten, the numbers added to the latitude diagram and probably the pecking and dashing of significant lines on this same diagram can be ascribed to this hand, as can the names of the cardinal points, the numbers and the zodiacal signs on the universal projection although this itself, given that the zodiac arc engraved by hand one works with it, is also probably by hand one. The engraving on the rule, the radius, and the alidade is by hand two.

The universal projection without stars, the naming of the four cardinal points, the graduated rule and the accurate ecliptic scale attached to it, are all elements employed in the form of universal astrolabe, known as the 'Mathematical lewell', that John Blagrove published in 1585. In Blagrove's instrument however the zodiac arc, which is part of an elaborate, fretted rete, is not fully graduated. This difference, and the fact that this arc was constructed by hand 1, suggests that the universal grid is also to be ascribed to hand 1, and therefore dates from the second half of the 15th century. That such should be the case is not improbable for a complex 14th century Syrian astrolabe incorporating the arrangement later 'reinvented' by Blagrove, and transmission to western Europe is entirely feasible. A parallel such transmission, eastwards to India is also known from the 17th century.

The present astrolabe however is not a Blagrove-type instrument. If one may conjecture that originally the obverse of the instrument was fitted with a conventional rete, and that the reverse was an universal instrument with its own rete resembling that employed by Ibn as-Sarrāj, then it must, almost a century later, have been altered. Quite why it should have been thought necessary to add a shadow square of ten remains mysterious, unless the owner was a convert to the decimal calculation promulgated by Simon Stevin (1548-1620) in the 1580s. The addition of numerals to the projected grids may be seen as a way of making the device more convenient in use, but the rudimentary rete, if such one may call it, constructed for the reverse

and the consequent total lack of stars, suggests a deliberate change, perhaps towards a use in which only the graphical calculation of ecliptic positions was of importance.

The recycling and adaptation of older instruments during the Early Modern period must have been, given the shortage and cost of good brass, a frequent event. As parallels to the present example one can cite the astrolabe by Muhammad b. Fattuh al-Khamā'ri (AH 619 [AD 1223/24], which was fitted with a new rete in the Arsenius workshops in Louvain c. 1560, and the 1399 English horary quadrant to which additions were made that have been attributed to Charles Whitwell c. 1595. These were a solar declination scale and, a strict parallel with the present instrument, numbering of the hour lines.

The calculated value for the latitude diagram allows the original instrument to have been made for, or in, anywhere in southern England (at least as far north as London), Flanders, Central Germany or Poland. Unfortunately however virtually no studies of the gothic script employed on late medieval instruments have been made that could assist towards a localisation. The humanist italic script of the second hand, however, seems to situate the changes it imports in one of the workshops of Flanders or England that employed the italic hand deriving from Gerard Mercator. An initial survey of the lettering suggests that an attribution to the workshop of Humphrey Cole in London may not be incorrect. Most of the letter forms are close to those of his known, signed, work; use of the term 'Latus' rather than 'umbra' to designate the shadow square can be paralleled on two of his instruments, while the lobed treatment of the ends of the alidade, which here gives rise to a clover-leaf form, is also consonant with other of his known pieces.

Conclusion

The present instrument seems to have been made, originally, in the mid- to late-fifteenth century and to have incorporated a version of the 14th century universal instrument of Ibn as-Sarrāj, the shakkāziyya, that would be 're-invented' in England in the 1580s by John Blagrove. At about, probably, the same time as Blagrove was working, the instrument, perhaps because it had lost its original retia, or was found too complex, was made more convenient for use by the addition of line numbers, and adapted for use exclusively for problems concerning the ecliptic. Despite being incomplete it supplies important evidence for the continuity in use, by recycling, of late medieval instruments in Early Modern Europe, and is highly significant as an hitherto unknown document for the presence of a rare and unusual form of universal astrolabe in late Medieval Europe and thus its transmission from Islam.

EB 1793

Bonhams

Montpelier Street
Knightsbridge
London SW7 1HH

+44 (0) 20 7393 3900
+44 (0) 20 7393 3905 fax



International Auctioneers and Valuers – bonhams.com